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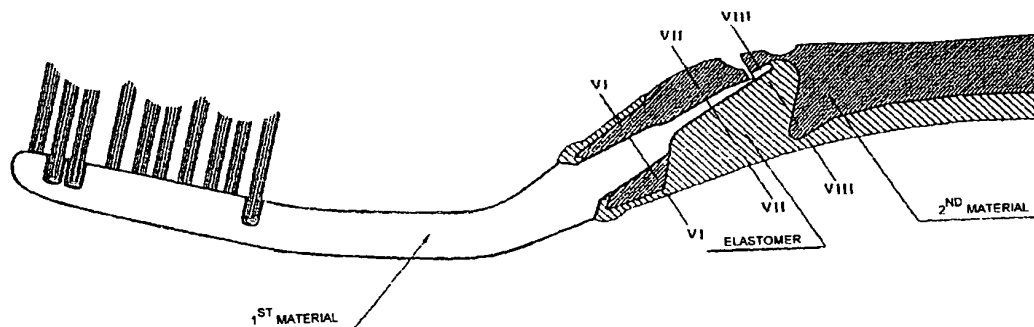
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(54) Title: **DISASSEMBLABLE TOOTHBRUSH WITH POSITIVE BLOCKING**



(57) Abstract: The present invention relates to a disassemblable toothbrush, comprising a bristled portion and a handle portion, said bristled portion comprising a coupling part having at least one flexible working portion provided with a tooth and said handle portion comprising a seat for engagement of said coupling part which has at least one locating element for retaining said tooth, in which said engaging seat (4) comprises a recess (4b) for housing a deformable elastomeric mass (E) able to exert an elastic reaction pressing against said flexible working portion of the coupling part so as to keep said tooth (3c) actively engaged with said locating element (6).

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"DISASSEMBLEABLE TOOTHBRUSH WITH POSITIVE BLOCKING"

5 The present invention relates to a disassemblable toothbrush. In particular it relates to a toothbrush which can be disassembled into a handle portion and a replaceable bristled portion which are connected together by an improved engaging and blocking system.

10 As is known, toothbrushes with a replaceable bristled portion already exist for some time now on the market, said toothbrushes being designed with the fundamental aim of providing an oral hygiene device which has appreciable ecological, low-cost and practical characteristics.

15 At the present time there are many types of such disassemblable toothbrushes in which the replaceable portion assumes correspondingly different forms and dimensions coinciding, in certain cases, with the head and a neck portion of the toothbrush and, in other cases, with a much more small portion of the toothbrush.

20 Recently there has been a more pressing need for a toothbrush which, while being able to be disassembled easily, is also well constructed with regard to robustness in the assembled state. In fact, owing to the presence of increasingly stringent regulations, it is necessary to comply with very high safety standards aimed at preventing the possibility of the bristled portion becoming detached from the handle portion and ending up freely inside the oral cavity, with the consequent risk of being swallowed or causing injury.

25 Examples of the prior art consist in the US patent 5,253,948 in the name of Butler and the international PCT applications WO97/14329 in the name of Le Bourdonnec and WO99/23911 in the name of Vasey. The assembly and blocking system, in these cases, is based on the engagement of deformable elastic parts which are coupled together and uncoupled by means of a simple manual pushing or pulling action on the two disassemblable portions: however, since there is no active or positive system for preserving the assembly, there remains a certain risk of accidental separation of the said portions.

30 US-A-5,875,510 in the name of Lamond et al. (on the basis of which the introductory part of the main claim is formed) and US 4,227,276 in the name of Ginsburg et al. illustrate assembly systems in which elastic tongues, integral with

the bristled portion and provided with teeth, are inserted into associated seats, being elastically deformed and engaging with their teeth in corresponding retaining openings in the handle portion. In order to be able to disassemble these toothbrushes, it is first necessary to press on the teeth beforehand so as to
5 deform the tongues and disengage the associated teeth from the openings, and then separate the two portions of the toothbrush by means of pulling.

Engagement of the teeth in the retaining openings is maintained by the inherent elasticity of the tongues of plastic material, namely by the elastic force which the tongues are able to exert, tending naturally to return into the
10 undeformed condition, i.e. the condition where the teeth are inserted inside the openings. This structure, however, has various drawbacks.

Firstly, the tongues are slender and have small dimensions and therefore are unable to exert a notable elastic force such as to prevent with certainty accidental disengagement of the teeth from the retaining openings.

Moreover, in view of the slender nature of the tongues, after repeated use
15 a certain degree of yielding of the plastic material may occur, said material thus further losing its elastic retaining capacity.

Finally, since mating of the two toothbrush portions must necessarily occur with a certain degree of play, the tongues must at least consist of two facing
20 tongues so as to exert opposing thrusting forces which ensure that at least one of the two teeth is always fully engaged in its retaining opening.

The Applicant, with the aim of overcoming all the problems of the prior art, has tackled the technical problem of providing a totally safe system for assembly of a disassemblable toothbrush, such as to be able to satisfy even the most
25 demanding requirements, developing a solution which simultaneously has a simple constructional design, a low manufacturing cost and is convenient and practical to use.

This object has been perfectly achieved by means of a toothbrush, the essential features of which are described in the accompanying claims.

Further details and characteristic features of the toothbrush according to
30 the invention will nevertheless emerge more clearly from the following description provided by way of example and illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view of a first embodiment of the toothbrush according to the invention;

Fig. 2 is a longitudinally sectioned view along the line II-II in Fig. 1, with the two toothbrush portions disassembled;

5 Figs. 3 and 4 are views, similar to those of Figs. 1 and 2, of a second embodiment of the invention;

Fig. 5 is an enlarged partial view of Fig. 2 with the toothbrush assembled;

Figs. 6, 7 and 8 are cross-sectional views along, respectively, the lines VI-VI, VII-VII and VIII-VIII in Fig. 5;

10 Fig. 9 is an enlarged view of Fig. 5 which illustrates operation of the toothbrush according to the invention;

Figs. 10-13 are views, similar to those of Figs. 5-8, relating to a second embodiment of the invention;

15 Fig. 14 is a detailed perspective view (on the scale 4:1) of the assembly system of the second embodiment;

Fig. 15 is a top plan view of the bristled portion, with the tufts removed, of the second embodiment;

Figs. 15A-15C are cross-sectional views along the lines A-A, B-B and C-C in Fig. 15; and

20 Fig. 16 is a view, similar to that of Fig. 9, relating to the second embodiment.

As can be seen in Fig. 2, a disassemblable toothbrush has a handle portion 1 assembled in a removable manner with a bristled portion 2.

25 The bristled portion 2 comprises a cleaning head 2a, to which tufts of bristles S are fixed, and a neck part 2b. A coupling part 3 extends from the end of the neck part 2b and is able to engage in an engaging seat 4 correspondingly provided in the handle portion 1.

30 According to the invention, the coupling part 3 has a substantially rigid initial body 3a and a more slender, substantially flexible working portion 3b on which a retaining tooth 3c is provided.

The engaging seat 4 comprises a guide mouth 4a which has a cross-section corresponding to that of the body 3a of the coupling part 3 and which terminates in a housing recess 4b. The recess 4b preferably opens outwards on at least one

side of the handle portion 1.

According to a first embodiment of the invention (Figs. 5-9) the working portion 3b is in the form of a tongue with a substantially rectangular cross-section (Fig. 7), tapered towards the end and flexible about a fulcrum point situated in the zone of connection with the body portion 3a.

A tooth 3c is provided on the end of the tongue 3b.

According to a preferred embodiment, on the bottom of the recess 4b the handle portion 1 has an interruption in continuity of the wall, in the form of a flexible button 5. The flexible button 5 is able to come into contact with the tooth 3c so as to be able to displace it, as will be described further below. Advantageously the button 5 has sufficiently large dimensions such that it may be pressed more easily by a user's finger (Fig. 9).

According to another embodiment of the invention (Figs. 10-16), the working portion 3b' has a U-shaped cross-section (Figs. 13 and 14). As can be seen in Figs. 12, 15 and 16, the working portion 3b' is interrupted by a transverse incision and by two longitudinal incisions which cut out a flexible tongue portion provided with a tooth 3c'. In this case also, the handle portion 1' preferably has, on its wall, a flexible button 5' able to come into contact with the tooth 3c'.

In the working position of the toothbrush, namely when the bristled portion 2, 2' is fully engaged in the handle 1, 1', the initial body 3a, 3a' is housed and guided precisely in the guide mouth 4a, while the retaining tooth 3c, 3c' is positioned in correspondence of a shoulder or locating portion 6, 6' provided inside the recess 4b, 4b' and integral with the handle. In this condition, the initial body retains the coupling part in its seat against the lateral forces applied to the head 2a and the tooth, being engaged with the locating portion 6, 6', but prevents any longitudinal sliding of the coupling part inside its seat.

According to the invention, moreover, the recess 4b is filled with a mass of elastomeric material E, for example introduced therein by means of a known multi-component injection process, through the opened side of the handle.

The elastomeric mass E occupies a volume inside the recess 4b and is deformed when also the coupling part 3 is inserted into the seat. The deformation of the mass E induces an elastic reaction of the elastomeric material which presses against the working portion of the coupling part in a direction such as to keep the

tooth 3c, 3c' actively engaged with the retaining portion 6, 6', with an action which is more efficient and longer-lasting than the ordinary natural elastic return of the flexible section of the coupling part 3.

5 Preferably, a thin layer E₁ of elastomeric material is also provided at the end of the handle portion 1, in the region of a contact surface 1a thereof. This layer E₁ is compressed, in the assembled state of the toothbrush, between the contact surface 1a and a corresponding stop surface 3d of the coupling part 3: the elastic reaction which is produced helps makes the assembly more stable, taking up part of the play which may be created.

10 As can be easily understood, assembly of the toothbrush occurs by means of insertion of the coupling part 3, 3' inside its own seat 4, 4', with a slight pressure able to bring the tooth 3c and 3c' beyond the locating surface 6 and 6'. When, however, the flexible button 5 and 5' is pressed (Figs. 9 and 14), the tooth 3c and 3c' is also pressed, causing flexing of the working portion 3b, 3b'. In this way, the tooth is lowered sufficiently such that it may be disengaged from the locating surface 6, 6' and thus allow the extraction of the bristled portion 2, 2' from the handle.

15 The extreme simplicity and rational nature of the solution proposed also mean that the entire toothbrush may be obtained by means of successive injection-moulding operations, without having to mould the various components separately and then assemble them later.

20 In particular, advantageously, the handle 1 and the bristled portion 2 are made of materials which are physically and/or chemically unrelated or incompatible, namely are such that they do not tend to bond with each other when they are moulded together or in succession one over another: as a result it is possible to use a co-moulding technique already also illustrated in European patent application No. EP-A1-1075806 in the name of the same Applicant, on the basis of which the seat 4 of the handle itself acts as a moulding die for the coupling part 3 (or vice versa).

25 Alternatively, should the two materials be too closely related, a thin layer of a separating substance may be provided in between such as to prevent the two components from becoming bonded together. Other techniques may be used to prevent the two materials being bonded together if moulded in succession one

over another.

5 In this way, on the one hand, it is possible to achieve a saving in the cost and simplification of the manufacturing process (the production machinery is correspondingly simpler and it is not required to recover and reassemble various parts during construction) and, on the other hand, excellent coupling tolerances are obtained, thereby ensuring efficient and reliable assembly of the two portions of the toothbrush.

With the toothbrush according to the invention the objects expressed in the introductory paragraphs have therefore been achieved.

10 In fact, the structure of the two portions which may be assembled is extremely simple, the handle being provided with a seat which can be easily moulded and the coupling part consisting of a single flexible working portion, it not being necessary to provide opposing elastic actions in order to eliminate any coupling play.

15 The structural simplicity, together with the original combination of materials which are unrelated or rendered incompatible, thereby making a co-moulding process possible, help achieve a general reduction in the production costs.

Moreover, the elastomeric mass, by exerting a significant elastic reaction, makes the assembly system extremely safe against accidental disassembly and takes up any play which would otherwise occur during use.

20 The excellent behaviour of the elastomeric material in response to repeated deformations (which certainly never reaches the yield point under the normal stress conditions to which it is exposed) does not give rise to any functional problems, even following numerous assembly and disassembly operations.

25 Finally, owing to the flexible button on the wall of the handle, which is not subject to dimensional or constructional restraints, it is possible to act easily on the underlying engaging tooth.

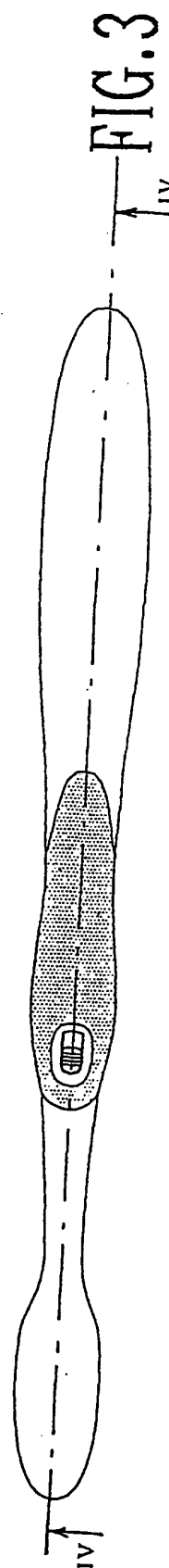
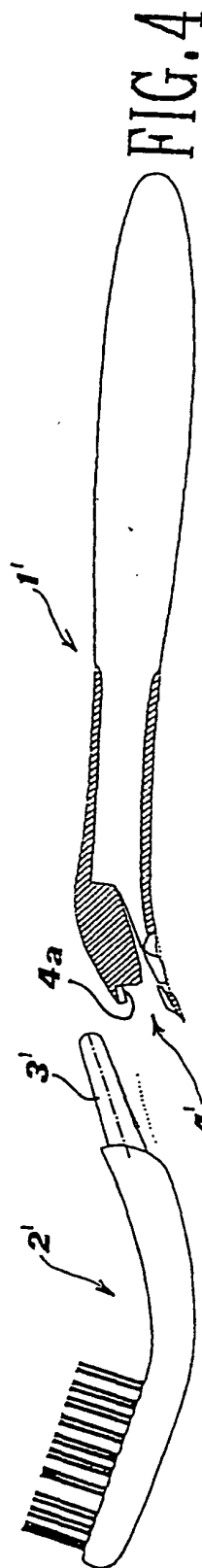
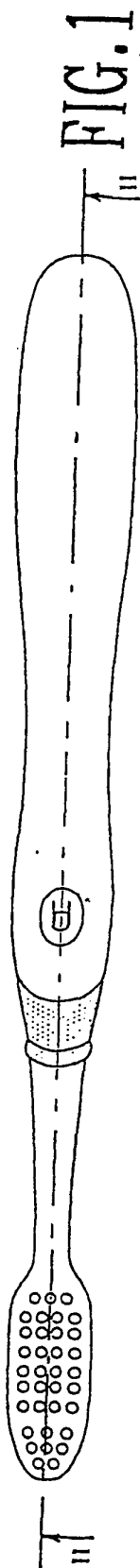
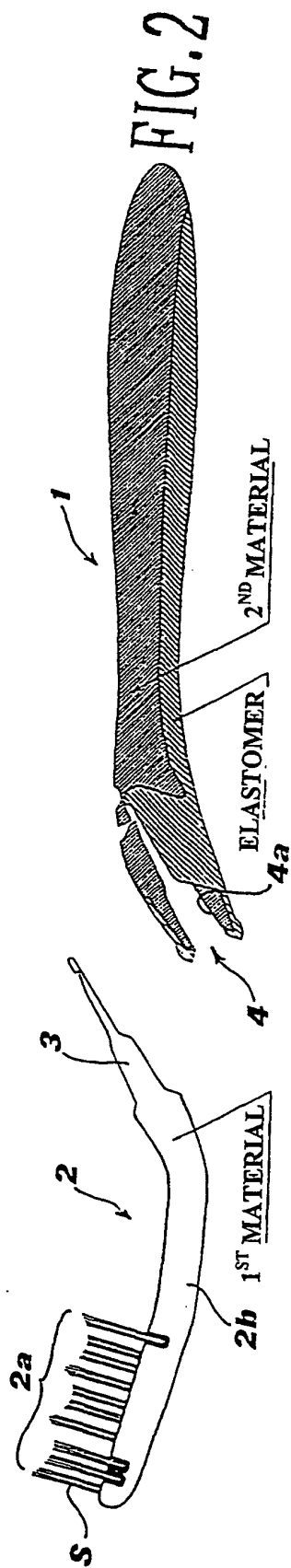
30 It is understood, however, that the protective scope of the invention described above is not limited to the particular embodiments illustrated, but extends to any other constructional variant which adopts the same teachings.

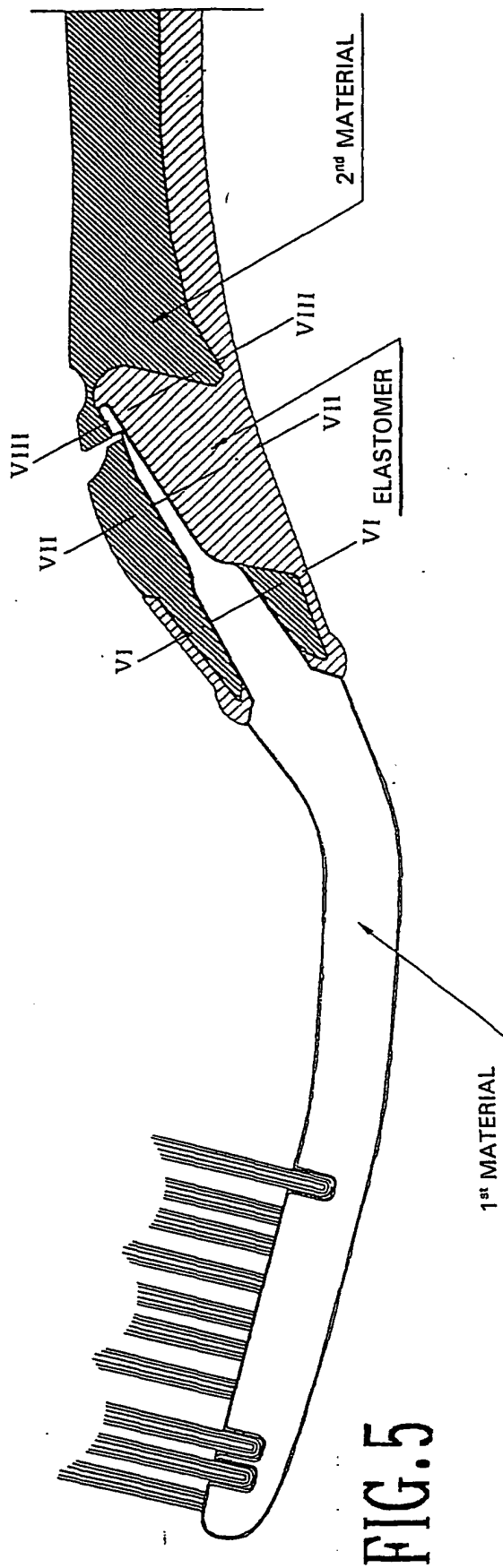
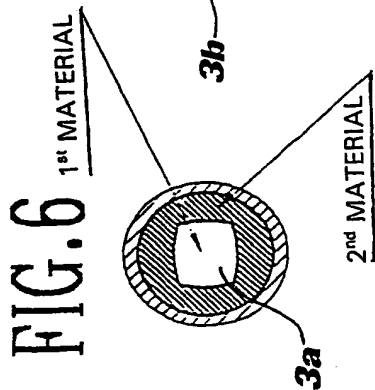
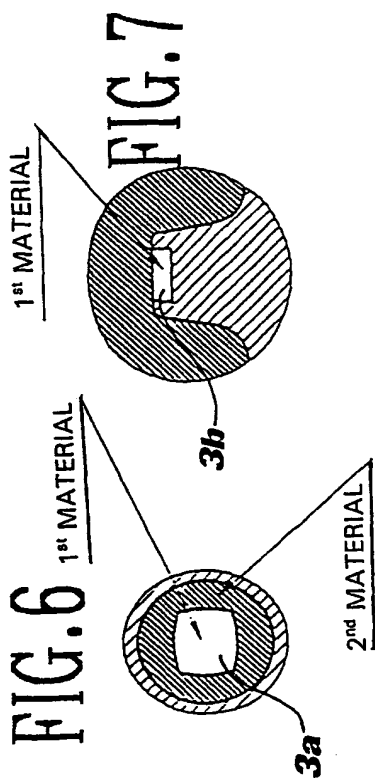
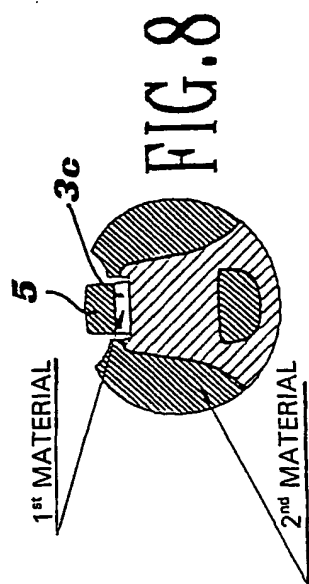
For example, it is undoubtedly obvious to a person skilled in the art that the straight configuration of the coupling part 3 is certainly not the only one compatible with the technical result which is to be achieved; in fact, similar

operation is obtained provided that the coupling part has a configuration which allows easy extraction thereof from the handle, for example if the coupling part is formed in the manner of an arch of a circle with constant radius.

CLAIMS

1. Disassemblable toothbrush, comprising a bristled portion and a handle portion, said bristled portion comprising a coupling part having at least one flexible working portion provided with a tooth and said handle portion comprising a seat for engagement of said coupling part which has at least one locating element for retaining said tooth, characterized in that said engaging seat (4) comprises a recess (4b) for housing a deformable elastomeric mass (E) able to exert an elastic reaction pressing against said flexible working portion of the coupling part so as to keep said tooth (3c) actively engaged with said locating element (6).
2. Toothbrush according to Claim 1, in which said recess opens outwards on one side of the handle portion.
3. Toothbrush according to Claim 1 or 2, in which said coupling part consists of a substantially rigid body (3a) which acts as a lateral guide and from which said flexible working portion extends.
4. Toothbrush according to any one of the preceding claims, in which said handle portion has a flexible button (5) in correspondence of said tooth (3c), having dimensions such that it may be easily pressed by a user's finger and able to act on said tooth so as to disengage it from said locating element.
5. Toothbrush according to Claim 4, in which said flexible button (5) is formed as one piece with said handle.
6. Toothbrush according to any one of the preceding claims, in which said coupling part has a U-shaped profiled portion.
7. Toothbrush according to Claim 6, in which said U-shaped profiled portion is interrupted centrally by a transverse incision and by two longitudinal incisions so as to form said flexible working portion.
8. Toothbrush according to any one of the preceding claims, in which said bristled portion and said handle are made of materials which are unrelated or rendered incompatible, such that they do not bond with each other during a co-moulding process.
9. Toothbrush according to any one of the preceding claims, in which at least one further cushion of elastomeric material is arranged between said bristled portion and said handle and is able to produce an elastic reaction in the direction of assembly of the toothbrush.





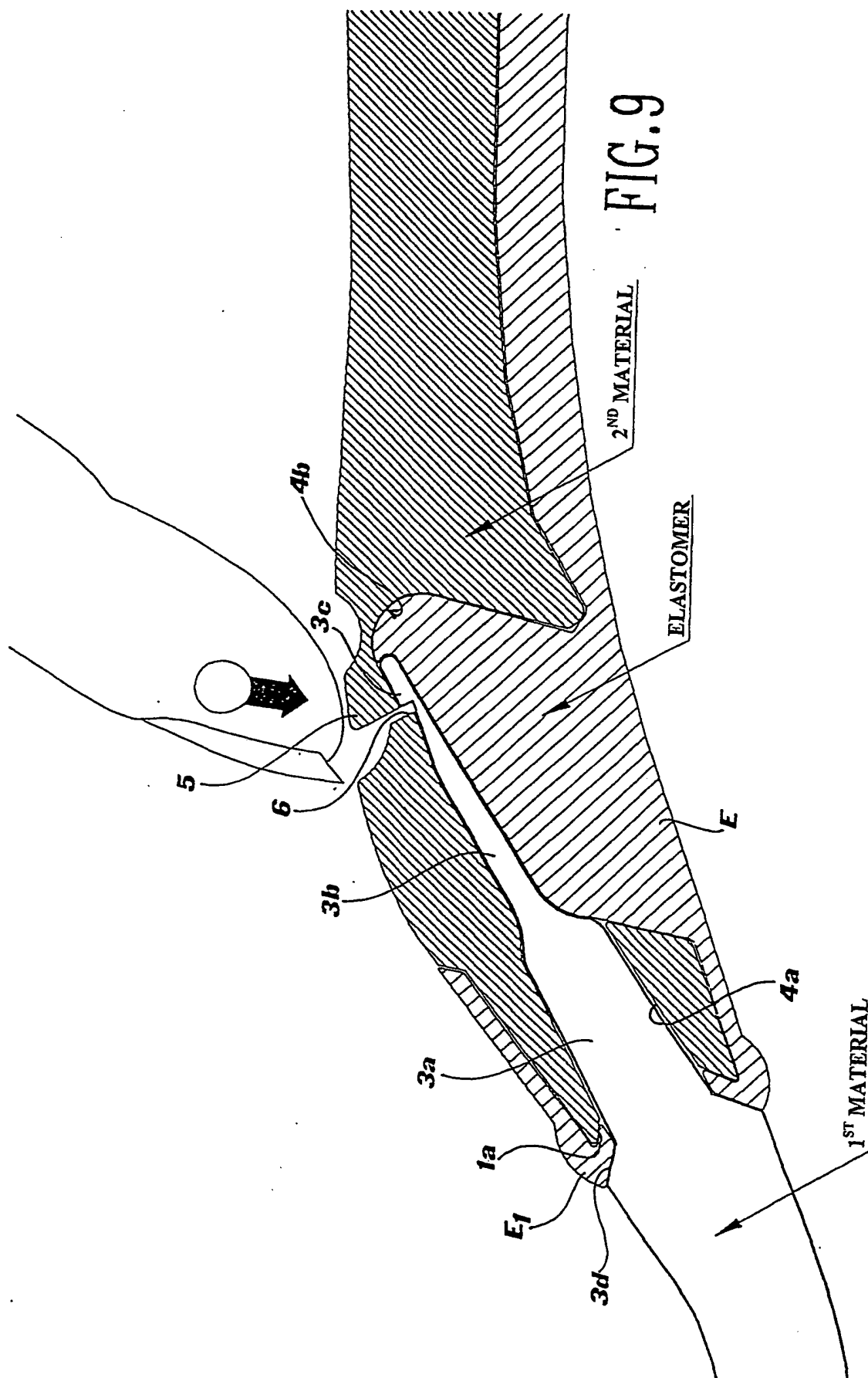


FIG. 13

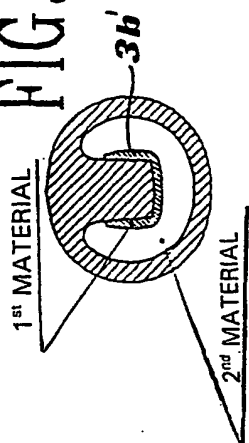


FIG. 12

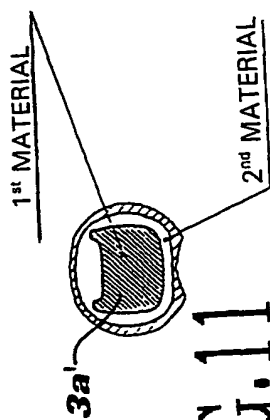
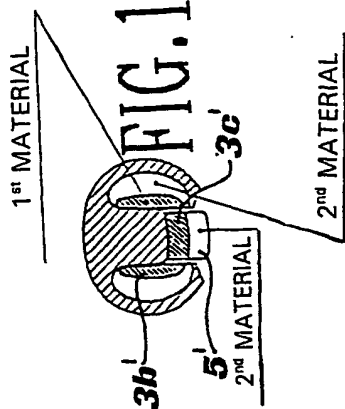


FIG. 11

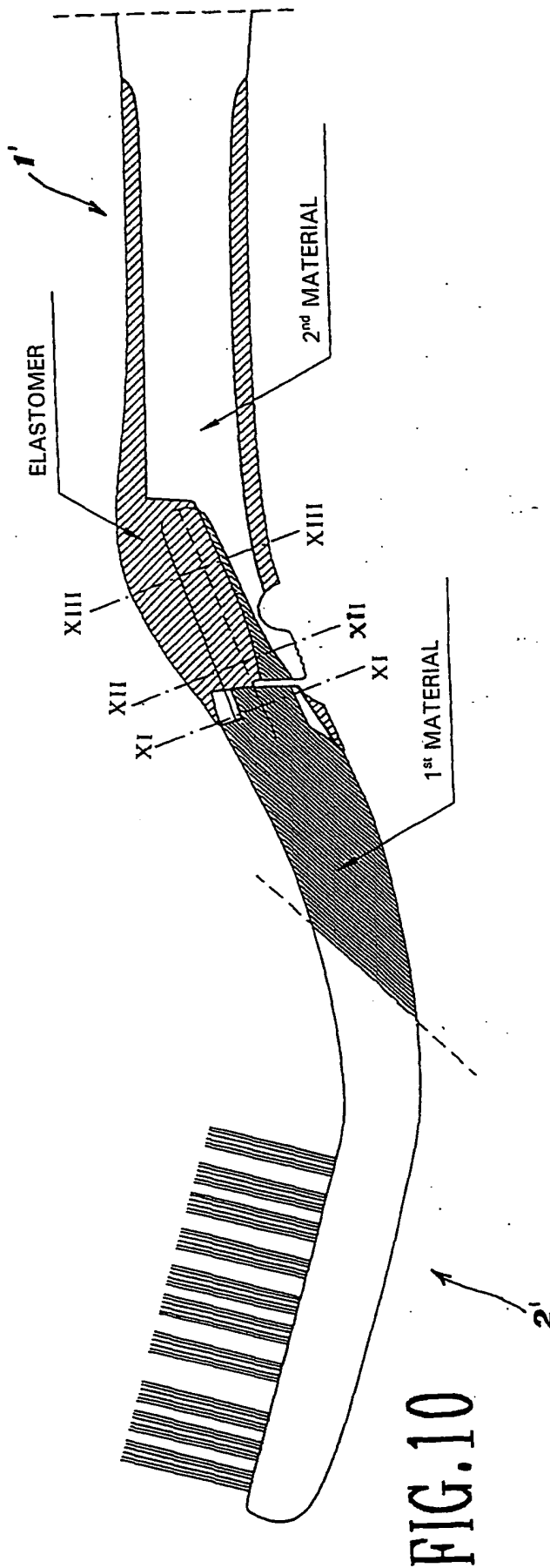


FIG. 10

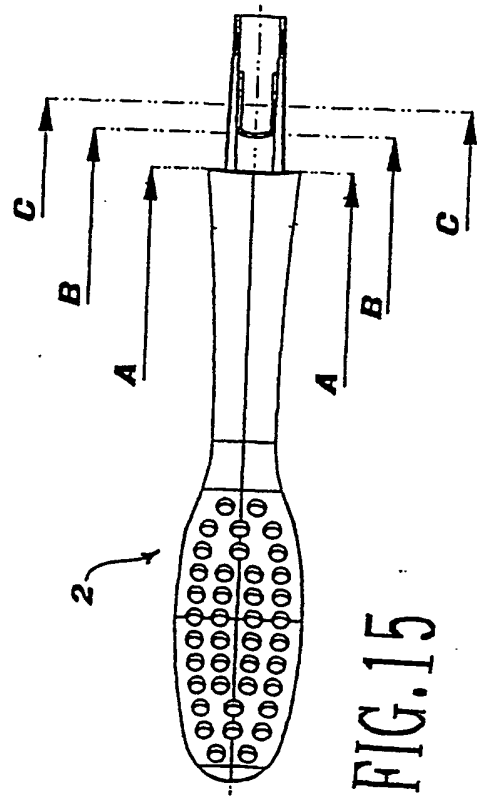
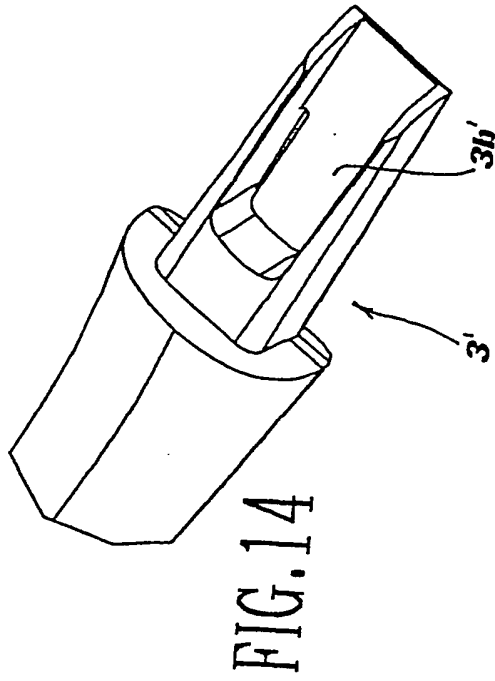


FIG. 15A

FIG. 15C

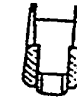
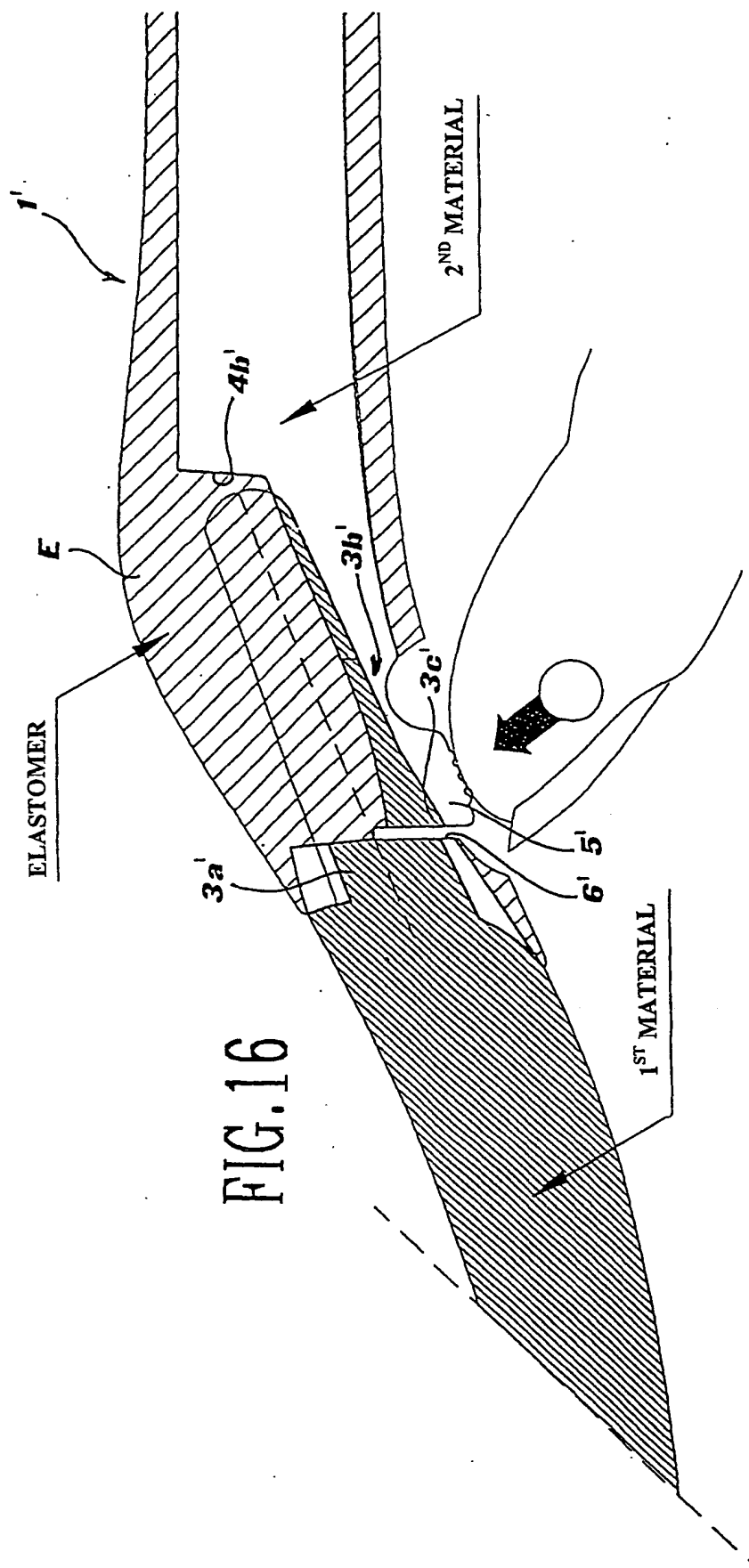


FIG. 15B





INTERNATIONAL SEARCH REPORT

Int. Application No

PCT/IB 01/00857

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A46B5/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A46B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 673 452 A (CHANG CHING-MIN ET AL) 7 October 1997 (1997-10-07) abstract	1-5,8,9
A	column 3, line 6 - line 30; figure 8	6,7
X	US 5 875 510 A (LAMOND DONALD ET AL) 2 March 1999 (1999-03-02) abstract	1-4,6-9
A	column 3, line 40 -column 4, line 18; figures 5,8	5
E	WO 01 43583 A (BROSSE ET DUPONT SA ;LEFEVRE JEAN LUC (FR)) 21 June 2001 (2001-06-21) page 3, line 5 -page 4, line 31; figures	1-4,6,8
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

3 October 2001

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 01/00857

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

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